IN THE SPECIFICATION:

Please amend page 1, paragraph 1 to page 6, paragraph 3 as follows:

The present invention relates to an elastomer composition and a rubber roller composed of the elastomer composition. More particularly, the present invention relates to the elastomeric ~~elastomer~~ composition that can be preferably used as a ~~the~~ rubber roller ~~that is used~~ in a paper-feeding mechanism of an ink jet printer, a laser printer, an electrostatic copying apparatus, a facsimile apparatus, an automatic deposit payment machine (ATM), and the like, to feed objects such as sheets of paper or films by picking up the objects one by one, separately, from the objects piled up one upon the other ~~another~~. Therefore, the present invention is intended to provide ~~allow~~ the rubber roller ~~to have~~ with a high friction coefficient and a high wear resistance.

Description of the Related Art

A paper-feeding roller formed by molding a rubber composition is used in the paper-feeding mechanism of ~~the~~ electrostatic copying apparatus, ~~the~~ laser printers ~~printer~~, ~~the~~ ink jet printers ~~printer~~, ~~the~~ facsimile apparatus; and ~~the~~ automatic deposit payment machines ~~machine~~ (ATM). ~~The paper feeding~~ Paper-feeding rollers ~~roller~~ composed of ~~the~~ rubber compositions have the ~~composition has~~

~~a~~ problem that the ~~a~~ paper supply state becomes bad due ~~owing~~ to the blooming of sulfur contained in the rubber composition.

A vulcanizing system consisting of a peroxide is known as a rubber-vulcanizing system which does not use ~~using~~ sulfur. To suppress blooming, a paper-feeding roller using rubber vulcanized by a vulcanizing system consisting of an organic peroxide is proposed.

Disclosed in Japanese Patent Application Laid-Open No. 8-334939 is a ~~the~~ rubber composition for a roller containing 100 parts by weight of ethylene-propylene copolymer and 3 to 6 parts by weight of vulcanizing agent containing a peroxide.

Disclosed in Japanese Patent Application Laid-Open No. 2000-248133 is a ~~the~~ rubber composition containing ethylene-propylene-diene rubber, carbon black (not less than 25 wt% nor more than 50 wt%) in which an oil absorption amount is specified, paraffin process oil, and an organic peroxide for crosslinking the ethylene-propylene-diene rubber.

However, although blooming does not occur in the paper-feeding roller using ~~the~~ rubber vulcanized by the vulcanizing system consisting of ~~the~~ organic peroxide, the wear resistance of the paper-feeding roller is inferior to that of a paper-feeding roller using rubber vulcanized with sulfur.

The paper-feeding roller proposed in Japanese Patent Application Laid-Open No. 8-334939 is capable of favorably feeding

not more than 200,000 sheets of paper. That is, the paper-feeding roller has a problem in its wear resistance.

The paper-feeding roller proposed in Japanese Patent Application Laid-Open No. 2000-248133 contains a large amount of carbon black to secure electric conductivity. More specifically, the paper-feeding roller contains not less than 25 wt% nor more than 50 wt% of the carbon black. The paper-feeding roller has favorable electric conductivity, but has a problem in its wear resistance because the paper-feeding roller becomes ~~is~~ worn due ~~owing~~ to repeated contact between it and paper. Another problem of the paper-feeding roller is that the paper is stained with the carbon black. The paper-feeding roller has still another problem in that it has a high hardness due ~~owing~~ to the reinforcing effect of the carbon black and hence does ~~odes~~ not have a sufficient friction coefficient.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above problems. Thus, it is an object of the present invention to provide an elastomer composition superior in its wear resistance and its ability not to stain ~~staining~~ paper and a rubber roller composed of such an ~~the~~ elastomer composition.

To achieve this ~~the~~ object, the present invention provides an elastomer composition containing a rubber and/or or/and a

thermoplastic elastomer as a main component thereof and a reinforcing filler dispersed in the rubber and/or ~~or/and~~ the thermoplastic elastomer.

~~A~~ The T2 relaxation time (spin-spin relaxation) of the ~~a~~ bound rubber formed due to the ~~in a portion which is disposed in~~ close proximity between ~~vicinity to~~ the rubber and/or ~~or/and~~ the thermoplastic elastomer and the reinforcing filler, ~~and includes an~~ including the interface therebetween, is set to be not less than 250μs nor more than 400μs.

~~As a result of energetic researches, the~~ The present invention has ~~inventors have~~ found that an elastomeric ~~the elastomer~~ composition having a certain range in the T2 relaxation time (spin-spin relaxation) of the bound rubber formed ~~in the portion which is disposed in~~ due to the close proximity between ~~vicinity to~~ the rubber and/or ~~or/and~~ the thermoplastic elastomer and the reinforcing filler, including ~~and includes~~ the interface between the rubber and/or ~~or/and~~ the thermoplastic elastomer and the reinforcing filler, has superior wear resistance ~~and made the present invention~~. Because the elastomer composition is excellent in its wear resistance, it exhibits ~~has~~ a small amount of wear over ~~in a~~ long-time use and a high durability. Further it is possible to suppress a reduction of its friction coefficient. ~~Furthermore~~ Also, since the elastomeric ~~elastomer~~ composition contains a small amount of the reinforcing filler such as the carbon black, the T2

relaxation time is set to a narrow range. Therefore the rubber roller does not stain paper. Further the reduction of the friction coefficient of the elastomeric ~~elastomer~~ composition can be suppressed because blooming does not occur.

The T2 relaxation time (spin-spin relaxation) of the bound rubber formed between the rubber and/or ~~or/and~~ the thermoplastic elastomer and the reinforcing filler is a value obtained by measuring the elastomeric ~~elastomer~~ composition of the present invention in a solid echo method by using a nuclear magnetic resonator (pulse-NMR).

Immediately after the elastomeric ~~elastomer~~ composition is irradiated with a radio wave of NMR, arrows of nuclear spins point in ~~to~~ the same direction. That is, the nuclear spins are in phase, namely, in a coherent state. The state of the nuclear spins change from the coherent state to a random state (arrows of nuclear spins point in ~~to~~ different directions) because one nuclear spin feels the ~~feel~~ nonuniform swing of magnetic fields of other nuclear spins. The spin-spin relaxation (lateral relaxation) means the process of changing ~~the change~~ from the coherent state to the random state. The signal of the lateral relaxation is detected by a coil installed vertically to an external magnetic field. The exchange of energy is not made by the change from the coherent state to the random state, but the states of disorder are different from one another.

The bound rubber is polymer chains subjected to the influence of ~~a~~ molecular motion generated by the ~~an~~ interaction between the rubber or/and the thermoplastic elastomer and the reinforcing filler, in that ~~the~~ portion where there is a ~~that is disposed in~~ close proximity between ~~vicinity to~~ the rubber or/and the thermoplastic elastomer and the reinforcing filler, including ~~and includes~~ the interface therebetween.

When the reinforcing filler is mixed with the rubber or/and the thermoplastic elastomer, the bound rubber is formed in that ~~the~~ portion which is disposed in close proximity ~~vicinity~~ to the rubber or/and the thermoplastic elastomer and the reinforcing filler and includes the interface therebetween. Generally, the molecular-motion performance of the bound rubber is low. In the case of carbon black, the molecular-motion performance of the bound rubber is particularly low. The stronger the interaction, the more effective for the wear resistance. ~~The present inventors have made energetic researches and~~ According to the present invention, it has been found that it is possible to improve the wear resistance of the elastomer composition by controlling the T2 relaxation time of the bound rubber and the T2 relaxation time of the rubber or/and the thermoplastic elastomer by adding a very small amount of the reinforcing filler such as the carbon black to the rubber or/and the thermoplastic elastomer.

The reason the T2 relaxation time of the bound rubber is set to not less than 250μs nor more than 400μs is as follows: If the T2 relaxation time of the bound rubber is set to less than 250μs, the restraint on the bound rubber is too high, which does not give a favorable influence on the wear resistance of the elastomer composition. On the other hand, if the T2 relaxation time of the bound rubber is set to more than 400μs, the interaction is hardly generated and the reinforcing filler is present as a foreign matter, which deteriorates the wear resistance of the elastomer composition and makes it difficult to realize a composition having not less than 400μs in the T2 relaxation time. It is more favorable that the T2 relaxation time of the bound rubber is set to not less than 300μs nor more than 400μs.

When a plurality of reinforcing fillers and a plurality of polymer components (rubber and thermoplastic elastomer) are used, it is favorable that the T2 relaxation time of each of the bound rubbers between the reinforcing fillers and the polymer components is not less than 250μs nor more than 400μs. It is essential that the T2 relaxation time of the bound rubber between one main reinforcing filler and one main polymer component is not less than 250μs nor more than 400μs.

It is preferable that the JIS-A hardness (hardness measured by method specified in JIS- K6253 (test of durometer type A)) is not less than 20 nor more than 45. The rubber roller having the JIS-A

hardness in this range can be used favorably as a roller for feeding paper and films.

Please amend page 8, second full paragraph, as follows:

The use of the EPDM as the rubber and/or ~~or/and~~ the thermoplastic elastomer provides the following advantages: The friction coefficient of the EPDM can be easily adjusted in dependence on the amount of the oil-extended rubber. The main chain of the EPDM consists of saturated hydrocarbon and does not have double bonds. Therefore, even though the EPDM is exposed to a high-density ozone atmosphere or irradiated with light for a long time, the molecular main chain is hardly cut. Accordingly, it is possible to enhance weatherability and oxidation resistance of the obtained elastomer composition. As the EPDM, it is possible to use oil-unextended type consisting of a rubber component and oil-extended type containing the rubber component and extended oil.

Please amend page 10-11, first and second full paragraphs, as follows:

It is preferable to crosslink the elastomer composition with organic peroxides. Since the elastomer composition is crosslinked with the organic peroxide, blooming of sulfur does not occur unlike

compositions vulcanized with sulfur. Thus the elastomer composition does not have a decrease in its friction coefficient. Further the elastomer composition crosslinked with the organic peroxide has a low compression set. Thus the rubber roller composed of such an elastomer composition is superior in maintaining accuracy and in durability, can be easily processed and molded, and is equivalent to compositions vulcanized with sulfur in static and dynamic mechanical properties. Further the elastomer composition can be prevented from being subjected to crosslinking inhibition.

To set the T2 relaxation time of the bound rubber to the above-described range, it is preferable to use not less than 2.5 nor more than 15 parts by weight of the reinforcing filler for 100 parts by weight of the rubber or/and the thermoplastic elastomer in dependence on the kind of the rubber and/or ~~or/and~~ the thermoplastic elastomer and that of the reinforcing filler. If less than 2.5 parts by weight of the reinforcing filler is used for 100 parts by weight of the rubber or/and the thermoplastic elastomer, the T2 relaxation time of the bound rubber is liable to be less than 250μs. On the other hand, if more than 15 parts by weight of the reinforcing filler is used for 100 parts by weight of the rubber or/and the thermoplastic elastomer, the elastomer composition is liable to harden and the friction coefficient thereof is liable to become low. It is favorable to use not less

than 0.5 nor more than three parts by weight of the crosslinking agent consisting of the peroxide for 100 parts by weight of the rubber and/or ~~or/and~~ the thermoplastic elastomer.

Please amend page 12, last paragraph, to page 13, first paragraph as follows:

It is preferable that the T2 relaxation time (spin-spin relaxation) of the bound rubber formed between the rubber and/or ~~or/and~~ the thermoplastic elastomer and the reinforcing filler is more than a T2 relaxation time of a bound rubber of the rubber and/or ~~or/and~~ the thermoplastic elastomer to which the reinforcing filler is not added by not less than 150% nor more than 300%.